

### **AMENDMENTS TO THE DRAWINGS**

The attached replacement sheet for FIG. 3 is submitted for the Examiner's approval. The attached replacement sheet renumbers the structural elements illustrated in FIG. 3.

Attachment: Replacement sheets

## REMARKS

Claims 1-7 and 9-12 are pending in this application. Claims 1-7, 9 and 10 have been amended. Claim 8 has been canceled and its limitations have been incorporated in amended independent claims 1 and 10. New claim 11 has been added to narrow the thickness range recited in claim 2. New claim 12 has been added to positively recite the step of "cooling the thermowell by contacting the thermowell with a process stream." No new matter has been introduced.

A proposed drawing amendment for FIG. 3 is submitted for the Examiner's approval. Applicants note that the corrections to FIG. 3 renumber all structural elements illustrated in FIG. 3. Paragraph [0041] on page 7 of the specification has been also amended to renumber the elements illustrated in FIG. 3 and to obviate the objections to drawings and specification. The Abstract of the invention has been rewritten in one paragraph.

At the outset, Applicants submit that the claimed invention relates to the cooling of a thermowell by means of a catalyst catalyzing an endothermic reaction (i.e., steam reforming) on the surface of the thermowell (page 4, last paragraph to page 5, first paragraph). None of the references cited in the May 4, 2005 Office Action expressively or inherently teaches a thermowell provided with a catalyst that is active in endothermic steam reforming, to achieve cooling of the thermowell. Below, Applicants address the rejections of claims 1-7, 9 and 10 in the order presented in the May 4, 2005 Office Action.

Claims 1-7 and 9 are rejected under 35 U.S.C. §112, second paragraph, as being "indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention." (Office Action at 3). Specifically, the

Office Action asserts that "since the claims(s) do not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass." (Office Action at 3). Claim 1 has been amended to obviate the rejection. Applicants submit that all pending claims are now in compliance with 35 U.S.C. §112.

Claims 1, 3 and 10 are rejected under 35 U.S.C. §102(b) as being anticipated by Schliephake et al. (U.S. Patent No. 6,333,011) ("Schliephake"). This rejection is respectfully traversed.

The claimed invention relates to a method for measurement of high temperatures of a process stream and to a temperature measurement instrument. As such, amended independent claim 1 recites a "method for measurement of high temperatures of a process stream" by *inter alia* "providing a thermocouple arranged in a thermowell, wherein the thermowell is at least partly covered by a layer of a catalytic material being active in at least one endothermic catalyzing steam reforming reaction." Amended independent claim 1 also recites "contacting the thermowell with a process stream during the endothermic catalysing steam reforming reaction, to carry out the temperature measurement."

Amended independent claim 10 recites a "temperature measurement instrument comprising a thermocouple inserted in a thermowell, wherein the thermowell is at least partly covered by a layer of a catalytic material." Amended independent claim 10 also recites that the catalytic material is "active in at least one endothermic catalyzing steam reforming reaction."

Schliephake teaches a thermoelement with a thermocouple (14 in Fig. 6) arranged within a thermowell (18). The element is axially disposed in a tubular reactor. (15, Col. 5, lines 4-11). The tubular reactor of Schliephake is charged with solid catalyst

particles for exothermal reactions. (Col. 3, lines 2-30 and 42-50). The catalyst particles are arranged as a catalyst bed. (Col. 3, 56 and 57).

Schliephake fails to anticipate the subject matter of claims 1, 3 and 10. Schliephake does not disclose "providing a thermocouple arranged in a thermowell, wherein the thermowell is at least partly covered by a layer of a catalytic material being active in at least one endothermic catalyzing steam reforming reaction," much less "contacting the thermowell with a process stream during the endothermic catalyzing steam reforming reaction, to carry out the temperature measurement," as amended independent claim 1 recites. Schliephake also fails to disclose "a thermocouple inserted in a thermowell, wherein the thermowell is at least partly covered by a layer of a catalytic material . . . active in at least one endothermic catalyzing steam reforming reaction," as amended independent claim 10 recites. Schliephake teaches that its thermoelement is employed in exothermal heat-creating reactions, and not in an "endothermic catalysing steam reforming reaction," as in the claimed invention.

Applicants also submit that the assertion in the May 4, 2005 Office Action that thermowell 18 of Schliephake "is at least partially covered by a layer of a catalytic material (Col. 1, Lines 12-47)" is unsupported. In Col. 1, lines 12-47, Schliephake only teaches that exothermal reactions such as oxidation reactions are "carried out in tubular reactors" and that the temperature profile "is usually obtained by means of a thermocouple or a resistance thermometer." (Col. 1, lines 12-14 and 32-34). Schliephake does not disclose, teach or suggest, however, that "the thermowell is at least partly covered by a layer of a catalytic material," much less that "the thermowell is at least partly covered by a layer of a catalytic material" which is "active in at least one endothermic catalyzing steam reforming reaction," as in the claimed invention. For

at least these reasons, Schliephake fails to anticipate the subject matter of claims 1, 3 and 10, and withdrawal of the rejection of these claims is respectfully requested.

Claims 1, 3 and 10 are rejected under 35 U.S.C. §102(b) as being anticipated by Nishio et al. (U.S. Patent No. 3,913,058) ("Nishio"). This rejection is respectfully traversed.

Nishio relates to a thermosensor that comprises a two-holed ceramic tube (2 in Fig. 1) and a heat sensitive element, i.e., thermocouple (1). Nishio teaches that a protective insulating tube (7) is intimately arranged on the ceramic tube (2) and as a thin layer around thermocouple (1). The ceramic tube of Nishio is coated with a catalyst substance to promote oxidation of uncombustive components in exhaust gas by oxidation (i.e., an exothermic reaction). (Col. 3, lines 16-25).

Nishio does not disclose all limitations of claims 1, 3 and 10. Nishio is silent about "providing a thermocouple arranged in a thermowell, wherein the thermowell is at least partly covered by a layer of a catalytic material being active in at least one endothermic catalyzing steam reforming reaction" (claim 1) or about "a thermocouple inserted in a thermowell, wherein the thermowell is at least partly covered by a layer of a catalytic material . . . active in at least one endothermic catalyzing steam reforming reaction" (claim 10). Nishio teaches a thermosensor with "improved vibration resistance and sensitivity" and having a two-holed ceramic tube that measures the temperature in a furnace or exhaust pipe, and not a thermowell that is "at least partly covered by a layer of a catalytic material being active in at least one endothermic catalyzing steam reforming reaction," as in the claimed invention. For at least these reasons, Nishio fails to anticipate the subject matter of amended independent claims 1

and 10, and withdrawal of the rejection of claims 1, 3 and 10 is also respectfully requested.

Claims 5-7 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Schliephake in view of Say et al. (U.S. Patent No. 5,143,647) ("Say"). This rejection is respectfully traversed.

Say relates to a "[S]tart-up procedure for FBSG process involving starting up under oxidizing conditions with Al<sub>2</sub>O<sub>3</sub> (no Ni) particles in the bed and the switching to reducing conditions prior to adding Ni/Al<sub>2</sub>O<sub>3</sub> catalyst." (Abstract). Say teaches that "[T]his procedure will prevent catalyst particle agglomeration." (Abstract).

The subject matter of claims of claims 5-7 and 9 would not have been obvious over Schliephake in view of Say. Applicants submit that the May 4, 2005 Office Action fails to establish a *prima facie* case of obviousness. Courts have generally recognized that a showing of a *prima facie* case of obviousness necessitates three requirements: (i) some suggestion or motivation, either in the references themselves or in the knowledge of a person of ordinary skill in the art, to modify the reference or combine the reference teachings; (ii) a reasonable expectation of success; and (iii) the prior art references must teach or suggest all claim limitations. See e.g., In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Rouffet, 149 F.3d 1350, 1355 (Fed. Cir. 1998); Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573 (Fed. Cir. 1996).

In the present case, Schliephake and Say, considered alone or in combination, fail to disclose, teach or suggest all limitations of claim 1. None of the cited references, alone or in combination, discloses, teaches or suggests "providing a thermocouple arranged in a thermowell, wherein the thermowell is at least partly covered by a layer

of a catalytic material being active in at least one endothermic catalyzing steam reforming reaction" or "contacting the thermowell with a process stream during the endothermic catalyzing steam reforming reaction, to carry out the temperature measurement," as amended independent claim 1 recites. As noted above, Schliephake teaches a tubular reactor charged with solid catalyst particles (arranged as a catalyst bed) for exothermal reactions (col. 3, lines 2-30 and 42-50), and not a thermowell provided with a catalyst active in endothermic steam reforming, to allow the cooling of the thermowell, as in the claimed invention.

Say does not disclose any of the limitations of amended independent claim 1. Say relates to a method for starting up a fluidized bed steam reforming-partial oxidation process, and not to the use of a thermoelement in a reactor for carrying out a steam reforming process, as in the claimed invention. Say does not even mention a thermoelement for use in temperature measurement in a fluidized catalyst reactor.

Applicants also submit that a person of ordinary skill in the art would not have been motivated to combine the teachings of Schliephake with those of Say to arrive at the claimed invention. The crux of Schliephake is a process that employs a fixed bed reactor. In contrast, Say teaches a process that is carried out in a fluidized catalyst bed, which requires different process conditions than those of a fixed bed reactor. In addition, the thermowell of Schliephake is in a fixed catalyst bed, which covers the thermowell as long as the catalyst is fixed around the thermowell. Consequently, if the catalyst particles of Say would be applied to the process of Schliephake, the fluidized catalyst particles of Say could not be able to cover the thermowell of Schliephake, much less to achieve the cooling of the thermowell, as in the present invention. Accordingly, one skilled in the art would not have been motivated to combine these disparate references and, for at least these reasons, the Office Action

fails to establish a *prima facie* case of obviousness. Withdrawal of the rejection of claims 5-7 and 9 is respectfully requested.

Claims 4 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Schliephake in view of Najjar et al. (U.S. Patent No. 5,005,986) ("Najjar"). This rejection is respectfully traversed.

Najjar relates to a thermocouple with a slag resistant sheath that is arranged within a reactor wall (Fig. 1). Najjar teaches that the sheath is made of palladium-silver alloy being permeable to hydrogen, so that the hydrogen converts any vanadium in the 5+ oxidation state present in the gases to be reacted in the reactor to non-corrosive oxides of vanadium in lower oxidation state. (Col. 2, lines 18-25).

Schliephake and Najjar, considered alone or in combination, fail to disclose, teach or suggest all limitations of amended independent claim 1. None of the cited references discloses, teaches or suggests "providing a thermocouple arranged in a thermowell, wherein the thermowell is at least partly covered by a layer of a catalytic material being active in at least one endothermic catalyzing steam reforming reaction," or "contacting the thermowell with a process stream during the endothermic catalyzing steam reforming reaction, to carry out the temperature measurement," as amended independent claim 1 recites. As noted, Schliephake teaches a tubular reactor charged with solid catalyst particles (arranged as a catalyst bed) for exothermal reactions (col. 3, lines 2-30 and 42-50), and not a thermowell provided with a catalyst active in endothermic steam reforming, so that the thermowell is cooled, as in the claimed invention. Najjar also fails to disclose, teach or suggest a thermowell being coated with a catalyst for endothermic steam reforming. For at least these reasons, the Office Action



fails to establish a *prima facie* case of obviousness and withdrawal of the rejection of claims 4 and 9 is respectfully requested.

Allowance of pending claims 1-7 and 9-11 is solicited.

Dated: July 15, 2005

Respectfully submitted,

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